MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2017 / 2018

PPS 0335 – PROBLEM SOLVING AND PROGRAMMING

(Foundation in Information Technology)

12 OCTOBER 2017
2:30pm – 4:30pm
(2 Hours)

INSTRUCTIONS TO STUDENT

1. This question paper consists of 4 pages (excluding the cover page) with 5 questions only.
2. Attempt **ALL** questions. All questions carry equal marks and the distribution of the marks for each question is given.
3. Please write all your answers in the Answer Booklet provided.

QUESTION 1 [10 Marks]

a. Write definitions to the following problem solving types.
   i. Algorithmic solutions
   ii. Heuristic solutions

(2 marks)

b. Identify the problem solving types to which each of these problems belongs. Group your answers in a table format as shown in **Table 1**.
   - To know if you have a virus on your computer.
   - To sort 10 men's height in increasing order.
   - To play a chess game program.
   - To open a door lock using number combinations.
   - To check a given number is a positive integer, then to determine that it is a prime number.
   - To find the largest number form a list of numbers.

Table 1

Algorithmic solutions	Heuristic solutions

(3 marks)

c. The left column in **Table 2** shows the six steps of program development life cycle (PDLC). Match the step in the left column with its main activities in the right column.

Table 2

Steps	Activities
1. analyze problem	A. check the logic of the design
2. design solution	B. debug the syntax errors and logic errors
3. validate design	C. group activities into modules; create algorithm
4. implement program	D. review program specifications; meet with the analyst and users; identify program components
5. test program	E. review program code and documentation
6. document program	F. translate the algorithm into a program

(3 marks)

d. Answer the following questions.
   i. Is an algorithm the same as a program? Explain briefly.
   ii. What is a programming language?

(2 marks)

Continued ...

QUESTION 2 [10 Marks]

a. Variables must be declared to store the input and output values. Determine appropriate data type of the values from the following input and output statement.
   i. To read a word "yes" or "no".
   ii. To read a letter 'M' or 'F'.
   iii. To read a car plate number "MCY 335".
   iv. To read a code '1' to start or '0' to stop.
   v. To find a cumulative grade point average (CGPA) with two decimal points.
   vi. To calculate quantity of items bought.

(3 marks)

b. Create a C++ computer equation to solve the following problems. Use the word in bold as the variables.
   i. Find the remaining **balance** of **cash** in the pocket after you spent 25% of it to buy a new cloth and RM5 for a parking ticket.
   ii. Find the **selling price** of item sold if the store wants to make profit 60% higher than the **original price**.
   iii. The sale advertisement shown: "Buy three tires at the regular price and get the fourth tire for RM3" John paid RM240 for the set of four tires at the sale. Find the **regular price** of one tire.
   iv. Find the **total wages** given the **hours worked** and **rate per hour**.

(4 marks)

c. Suppose X, Y and Z are integer data types and M, N and T are real data types. What value is assigned to each of these variables after each statement is executed. **Note: Each statement is independent from each other.** (Suppose a = 3, b = 5, and c = 14.6).
   i. $X = a + b * a$
   ii. $Y = b\ MOD\ a - a$
   iii. $Z = (a > b) OR\ (b > a)$
   iv. $M = a * c + (a + b)$
   v. $N = 20/3\ * (a + 7)$
   vi. $T = c\ /2 + b * 1.5$

(3 marks)

Continued ...

QUESTION 3 [10 Marks]

a. **Table 3** shows the percentage discount at a store during sale season.

Table 3

Sale Discounts	
Total Purchases (RM)	Discount
less than 50	25%
50 to 100	30%
over 100	35%

Develop a PAC (Problem Analysis Chart) for a solution to find the total purchase after discount. List the necessary variables for this problem and use them in the PAC.

(4 marks)

b. Lucy wants to develop a point-of-sale system for her retail shop. The system is to calculate and print the markup price and markup rate of each item scanned. Refer to **Table 4.** Design a pseudocode that will repeatedly read the item code, item name, cost and selling price and output its markup price and markup rate. This process continues until the item in the list finishes. Assume that the number of item is not fixed. Create your own trip value to stop the loop. List the necessary variables for this problem and use them in the pseudocode.

Table 4

Item Code	Item Name	Cost	Selling Price	Markup Price	Markup Rate (%)
S01	Spray paint	3.50	4.90	*e.g.:1.40*	*e.g.:40*
B01	Brush paint	2.00	2.55		
D01	Dry cloth	4.70	6.00		
L01	Oil	9.30	12.50		
P01	Paint remover	2.40	4.20		

(4 marks)

c. Refer to question 3(b). There are three types of loop logic structure that you can use in the algorithm to solve the problem. What are the **THREE (3)** types and which one do you use in your pseudocode?

(2 marks)

Continued ...

QUESTION 4 [10 Marks]

a. Sunshine Restaurant pays RM620 per week to its chef. The group medical insurance of the restaurant cover RM4,780 a year for the chef. As an employer, the restaurant pays 80 percent of the medical insurance and the balance has to bear by the chef. Develop an IPO (Input Processing Output) chart to find how much is deducted weekly from the pay for medical insurance coverage and the balance of the pay received weekly. List the necessary variables for this program and use them in the IPO.

(4 marks)

b. Most greenhouses have a computerized climate control system to constantly monitor the temperature. If the temperature falls below 19°C a heater is turned on. If the temperature rises above 21°C the heater is turned off. When the temperature goes over 25°C vents are opened to allow fresh air into the room and if it gets hotter than 29°C evaporative cooling is turned on. Once the temperature drops below 24°C vents are closed and cooling stops.

Design an algorithm to solve the above problem. The algorithm will read the room temperature and display the message accordingly. List the necessary variables for this program and use them in the algorithm.

(4 marks)

c. Refer to question 4(b). There are three types of decision logic structure that you can use in the algorithm to solve the problem. What are the **THREE (3)** types and which one do you use in your algorithm?

(2 marks)

QUESTION 5 [10 Marks]

a. Draw a flowchart for a program that will obtain a user's current annual salary and a percent increase due on that salary. Assume that the new pay rate is in effect on January 1, and assume it is now January 1. Calculate and produce output for the new monthly salary. List the necessary variables for this program and use them in the flowchart.

(3 marks)

b. Draw a flowchart for a program that will obtain a name and age from the user. If the user is 17 or older, output a message indicating they can apply for a driving license. If user under 17, output a message indicating how many years they must wait before they can apply for a driving licence. List the necessary variables for this program and use them in the flowchart.

(3 marks)

c. Draw a flowchart for a program that will dispense money from an ATM machine. Continue to request a withdrawal amount from the user until they enter -999. If the amount entered is not evenly divisible by ten, output the message "You must enter multiples of ten only" otherwise calculate and output the number of ten RM bills that the machine will dispense. List the necessary variables for this program and use them in the flowchart.

(4 marks)

End of Paper